

REMARKS/ARGUMENTS

Reconsideration of the application is requested.

Claims 1, 4, 10, 12, and 14-15 have been amended. Claims 21-26 stand withdrawn. New claim 27 has been added.

A formal drawing of Figure 1, the sole figure in this application, is being submitted concurrently with typed instead of handwritten lettering.

35 U.S.C. § 112

Claims 1-20 have been rejected under 35 U.S.C. § 112, second paragraph, as indefinite in the scope of the "iodine" catalyst. The Examiner has correctly understood that iodide salt catalysts are intended to be included also, and claim 1 is accordingly amended. The intended definition and focus of the invention on the method of treating a fatty acid mixture so as to recover oleic acid as a useful and valuable industrial product are also clarified by the amendment of claim 1. Basis for the amendment is found at page 2, line 29, to page 3, line 9, Example 6, and elsewhere in the specification, and no new matter is introduced. The category of iodine catalysts is recognized in the art, as exemplified by Matsuo U.S. 4,271,066 and Correia U.S. 4,659,513 acknowledged in the specification at page 2, lines 8 and 11.

Claims 2-20 depend upon claim 1 and are thereby amended as well.

It is respectfully suggested that any further questions relating to 35 U.S.C. § 112 are most efficiently resolved by telephone contact of the Examiner with the undersigned.

It is accordingly believed that the claims meet the requirements of 35 U.S.C. § 112, second paragraph. Should the Examiner find any further objectionable items, counsel would appreciate a telephone call during which the matter may be resolved. The above-noted changes to the claims are provided solely for cosmetic and/or clarificatory reasons. The changes are neither provided for overcoming the prior art, nor do they narrow the scope of the claims for any reason related to the statutory requirements for a patent.

35 U.S.C. § 103

It is respectfully submitted that the claims as amended are patentable over each of the rejections under 35 U.S.C. § 103 contained in paragraphs 11 to 16 of the Office action. Detailed responses to each of these rejections follow:

The first rejection, paragraph 11 of the office action:

Claims 1-6, 8-16, and 18-20 have been rejected under 35 U.S.C. § 103(a) as unpatentable over Matsuo U.S. 4,271,066 in view of any of four alternative secondary references, specifically the article by G. Silverstone in Journal of the American Oil Chemists' Society volume 44, no. 3, pages 502-505 (Silverstone), Jevne U.S. 4,156,095 (Jevne), Myers U.S. 2,955,121 (Myers), or Harrison U.S. 2,964,545 (Harrison).

The rejection is respectfully traversed for failing to consider the cited art as a whole, because one skilled in the art not having knowledge of the present invention has no basis for focusing on isolated portions of the art while disregarding other and contradictory portions thereof. As detailed below, the art includes statements and data that rather discourage and dissuade one skilled in the art from considering or attempting to use the method of the present invention requiring the use of a catalyst to cause the conjugation of double bonds in the starting material and a second catalyst to cause polymerization in order to produce a composition containing dimer/trimer acids and oleic acid and recovering oleic acid as useful and valuable industrial products.

It should be noted at the outset that one skilled in the art knows that the use of any catalyst in any chemical reaction is an empirical art with little or no predictability, so that the applicability of any particular catalyst must be established by actual trial and use.

One skilled in the art also knows that a proposed innovation in an established process like the production of dimer/trimer acids along with oleic acid on an industrial manufacturing scale is scrutinized with great skepticism by the engineers and others responsible for the operation, and must justify itself by sufficient improvement in yield, product quality, output in unit time, and/or other advantages to overcome inevitable added cost burdens in introducing and where necessary removing a new material. In particular, the use of a solid catalyst involves considerable cost burdens associated with the separation of the desired product from the catalyst after use.

Considering each of the cited references in turn, it is respectfully submitted that Matsuo et al does not teach a process for conjugating tall oil fatty acids or the desirability of such a process. On the contrary, Matsuo teaches that in the disclosed invention conjugated double bond materials are consumed and converted to other materials that

are deemed more suitable for Matsuo's intended use as emulsifier in a polymerization reaction, such as the copolymerization of styrene and butadiene of Examples 14-18, than products of prior art processes richer in conjugated double bond material.

Consistent therewith, there is no mention of conjugation in Matsuo in the abstract or in the cited passage at column 3, line 27, to column 4, line 19. Matsuo's Examples 9-12 disclose the conversion of a tall oil fatty acid starting material containing 31.1% oleic acid and 2.2% C18 conjugated diene acid to a product containing 73.6 to 75.1% oleic acid and 3.2 to 3.4% C18 conjugated diene acid using Matsuo's catalyst while Comparison Example 4 disclose the conversion of the same starting material to a product containing 45.4% oleic acid and 22.3% C18 conjugated diene acid. There is no mention whatsoever in Matsuo of fatty acid polymerization to afford dimer/trimer acids.

Consequently, one skilled in the art seeking to improve the long established production of dimer/trimer acids and oleic acid (see also analysis below of Myers) finds no guidance whatever in Matsuo, and moreover is specifically discouraged and dissuaded from considering a conjugation step as a helpful modification.

Silverstone (journal article), it is respectfully submitted, cannot be considered a teaching to produce "linoleic dimer/trimer acids and oleic acid byproducts" if this is intended to represent oleic acid as a valuable and useful industrial product. Silverstone does not disclose recovering any product. Silverstone discloses the analysis of samples taken from reaction mixtures (page 503, left, first two paragraphs) for monomer and dimer content by the method of Paschke (cited as ref. 16 in bibliography) This method does not distinguish oleic acid (i.e. cis-octadec-9-enoic acid) from other monounsaturated C18 acids known as iso-oleic and trans-oleic acid which are considered to be undesirable impurities in some commercial uses of oleic acid. The author acknowledges the uncertainty about the presence and quantity of oleic acid by stating in the Abstract "This (polymerization) was accompanied by trans-isomerization and some hydrogen transfer to form oleic (or iso-oleic) acids." The author's lack of interest in the production of oleic acid as a valuable product is further shown by the statement (page 503 left, third paragraph) "Residue from the distillation (of a sample) always contained some monomer, and corrected yields are expressed as weight percentage of residue after subtraction of the amount of monomer obtained from the above analysis". Monomer (whether or not oleic acid) in the residue

is clearly not available as valuable industrial product except as a result of further processing at added cost.

Moreover, Silverstone discloses nothing related to a conjugation catalyst as the disclosed starting material is a dehydrated castor oil with a high content of conjugated diene fatty acids (page 502, upper right and Table I at bottom).

Consequently, Silverstone contributes nothing helpful in combination with Matsuo to one skilled in the art seeking to improve the production of dimer/trimer acid with recovery of oleic acid. Nothing in Silverstone, in Matsuo, or both references considered together is deemed sufficient to persuade one skilled in the art to see justification for the added cost of handling and disposing of a solid clay catalyst.

Jevne's disclosure, while correctly summarized in the rejection, does not assist one skilled in the art seeking an improved method of producing dimer/trimer acids and recovering oleic acid as a valuable and useful industrial product. The disclosed process of reacting the linoleic acid portion in a fatty acid mixture with acrylic acid and separating the reacted mixture by distillation into "an oleic-type fatty acid and C21 dicarboxylic acid" (column 21 lines 54-56) is competitive to and minimizes the production of dimer/trimer

acid and analytically characterizes the product only by carbon number, i.e. C18 with no further information. Neither the statement (column 1 lines 57-61) relating to crystalline type clays used in dimerizing polyunsaturated monocarboxylic fatty acids nor the three columns of "details of the invention" provide any information about results obtained or to be expected in such dimerization.

The disclosure of Myers also acts to discourage and dissuade one skilled in the art seeking to improve the production of dimer/trimer acid from unsaturated fatty acid with recovery of oleic acid as a valuable and useful product. Myers discloses a method of manufacturing polymeric acids from unsaturated fatty acids which may be "monounsaturated or polyunsaturated or a mixture of the two" (column 1 lines 1-4). In the disclosed method, the fatty acids are heated in the presence of crystalline clay mineral and water (column 1 lines 34-35) modified with the incorporation of small amounts of alkali in the reacting mixtures (column 2 lines 10-11). By including monounsaturated fatty acids such as oleic acid among starting materials for the disclosed method, Myers teaches away from the use of a crystalline clay catalyst in a method that includes recovering oleic acid as a useful and valuable product.

The disclosure of Harrison also acts to discourage and dissuade one skilled in the art seeking to improve the production of dimer/trimer acid from unsaturated fatty acid with recovery of oleic acid as a valuable and useful product. Harrison discloses a process of cross linking fatty acids and at the same time retaining substantially their capacity to further cross link through oxidative polymerization, by treatment of the fatty acids with certain organic peroxides at temperatures in excess of 50°C and usually in excess of 100°C. The disclosed process, however, affords only a rather poor yield of the desired product, such as 20 grams dimeric product from 100 grams methyl linoleate starting material in Example 1. Against this background, the use of a separate conjugation causing catalyst accompanying the use of organic peroxide polymerization catalyst according to the present invention to produce a composition containing dimer and trimer acids and recover oleic acid as a valuable and useful industrial product is surprising and unexpected.

The second rejection, paragraph 12 of the Office action:

Claim 7 has been rejected under 35 U.S.C. § 103(a) as unpatentable over Matsuo in view of the same four secondary references cited above and further in view of Frenkel U.S. 3,373,175 (Frenkel). Frenkel discloses that essentially quantitative overall extent of fatty acid conjugation is

obtainable free of polymer formation by reacting polyunsaturated material such as linseed oil or soybean oil methyl esters with excess iron pentacarbonyl at a critical temperature of 185°C. The product fatty ester iron tricarbonyl complex can be decomposed by treating the complex with an alcohol solution of ferric chloride hexahydrate, without any polymerization as long as access of air is prevented by bubbling nitrogen.

Claim 7 depends upon claim 1 analyzed above. It is respectfully submitted that nothing in Frenkel's disclosure adds to the effect of Matsuo and/or the secondary references analyzed above. Frenkel provides no teaching whatsoever relative to production of a dimer/trimer acid or ester product or the recovery of oleic acid as a valuable and useful industrial product.

The third rejection, paragraph 13 of the Office action:

Claim 17 has been rejected under 35 U.S.C. § 103(a) as unpatentable over Matsuo in view of the Silverstone, Jevne et al., Myers and Harrison references analyzed above and further in view of Sturwold U.S. 4,885,104 or Papay U.S. 5,652,201. The latter secondary references are cited for showing the use of diatomaceous earth as filtering aid in filtering lubricants derived from natural fats and oils. Claim 17, however, depends

upon claim 1 analyzed above, and nothing in Sturwold or Papay provides any teaching relative to production of a dimer/trimer acid or ester product or the recovery of oleic acid as a valuable and useful industrial product.

The fourth rejection, paragraph 14 of the Office action:

Claims 1-4, 9-16 and 18-20 have been rejected under 35 U.S.C. § 103(a) as unpatentable over Ralston U.S. 2,411,111 in view of any of four alternative secondary references, specifically the article by G. Silverstone in Journal of the American Oil Chemists' Society volume 44, no. 3, pages 502-505 (Silverstone), Jevne U.S. 4,156,095 (Jevne), or Myers U.S. 2,955,121 (Myers) for certain claims, or Harrison U.S. 2,964,545 (Harrison) for certain claims.

The rejection acknowledges that Ralston differs from the applicant's claimed invention in that there is no direct disclosure to applicant's claimed polymerization step. The rejection, however, considers it obvious to use the teachings of the secondary references "as motivation to actually perform a polymerizing step, after the conjugation step, on the fatty acids in order to produce linoleic dimer/trimer acids plus oleic acid byproducts."

The rejection is respectfully traversed for failing to consider the cited art as a whole, because one skilled in the art not having knowledge of the present invention has no basis for focusing on isolated portions of the art while disregarding other and contradictory portions thereof. As detailed below, the art includes statements and data that rather discourage and dissuade one skilled in the art from considering or attempting to use the method of the present invention requiring the use of a catalyst to cause the conjugation of double bonds in the starting material and a second catalyst to cause polymerization in order to produce a composition containing dimer/trimer acids and oleic acid and recovering dimer/trimer acids and oleic acid as useful and valuable industrial products.

Ralston indeed discloses a process of "the treatment of unconjugated polyene organic material such as fats and fatty acids having a plurality of double bonds with amine hydroiodides, whereby the unconjugated polyene materials are converted to conjugated polyene products" (column 1, lines 3-8, but Ralston does not stop there. Ralston further discloses that the conjugated products have "improved drying or resinifying properties" (column 1, lines 8-9, also column 2, lines 37-45, column 4, lines 71-75, column, 5 lines 65-71, and column 6, lines 7-11 and 33-68. According to Ralston's

disclosure, "oils such as cottonseed oil, peanut oil, corn oil and other oils not ordinarily regarded as drying oils can also be treated by this (disclosed) procedure and their drying characteristics substantially improved." (column 2 lines 25-28).

It is respectfully submitted, however, that Ralston's disclosed advantages are seen as disadvantages by one skilled in the art seeking to improve the production of dimer/trimer acid and recover oleic acid as a useful and valuable industrial product, because the drying oil type polymerization chemically competes with the desired dimerization, thus diminishing the availability of the necessary starting material, and in addition physically slows down and inhibits the desired dimerization by the thickening and bodying effect disclosed by Ralston at column 6 lines 46-57 that increases viscosity.

Should one skilled in the art not having knowledge of the present invention feel "motivation to actually perform a polymerizing step in order to produce dimer/trimer acid products", such person, it is respectfully submitted, would more probably be motivated by Ralston's disclosure to choose an unconjugated starting material.

It is respectfully submitted, moreover, that none of the secondary references Silverstone, Jevne, Myers, or Harrison in fact provide the motivation asserted by the rejection. The analysis of these references in this connection is identical to that provided above and fully applicable here; it need not be repeated verbatim at this point.

The fifth rejection, paragraph 15 of the Office action:

Claims 5-8 have been rejected under 35 U.S.C. § 103(a) as unpatentable over Ralston cited above in view of the same four secondary references cited above, all said combinations still further in view of Matsuo, cited above, and/or Frenkel cited above. The rejection builds on the preceding rejection.

Claims 5-8 depend upon claim 1. The rejection is respectfully traversed for its apparent reliance on isolated portions of particular references instead of considering the art as a whole, which is the only way that one skilled in the art not having knowledge of the claimed invention can consider it. The rejection overlooks the direct contradiction of two of the references being "combined": To accomplish the respective disclosed purposes, Ralston causes double bonds to become conjugated, while Matsuo causes conjugated double bonds to be converted to different configurations.

Analysis of each of the references cited in this rejection and explanation of how each reference differs from the present claims is provided above and is identically applicable here without being reiterated word for word.

The sixth rejection, paragraph 16 of the Office action:

Claim 17 has been rejected under 35 U.S.C. § 103(a) as unpatentable over Ralston in view of the Silverstone, Jevne, Myers and Harrison references analyzed above and further in view of Sturwold U.S. 4,885,104 or Papay U.S. 5,652,201. The latter secondary references are cited for showing the use of diatomaceous earth as filtering aid in filtering lubricants derived from natural fats and oils. Claim 17, however, depends upon claim 1 analyzed above, and nothing in Sturwold or Papay provides any teaching relative to production of a dimer/trimer acid or ester product or the recovery of oleic acid as a valuable and useful industrial product.

OVERVIEW AND SUMMARY

The claims define a method for treating a fatty acid composition including polyunsaturated fatty acid with a conjugation catalyst to cause conjugation and a polymerization catalyst to cause polymerization of the conjugated polyunsaturated components to produce a composition containing linoleic dimer/trimer acids and oleic acid, and recovering

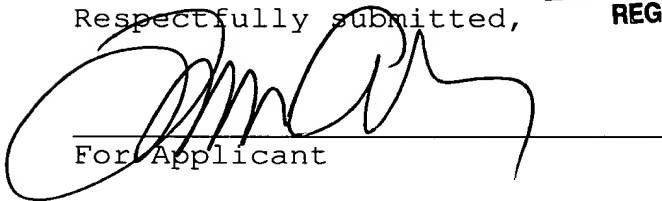
oleic acid. The use of the two kinds of catalyst and selection of particular catalysts of each kind in this method are clearly novel and unobvious because the cited art teaches away from the claimed combination.

Claims 1-20 are therefore deemed to define patentable subject matter and to be in order for prompt allowance, which is respectfully solicited.

Petition for extension is herewith made. The extension fee for response within a period of one month pursuant to Section 1.136(a) in the amount of \$110.00 in accordance with Section 1.17 is enclosed herewith. Please charge any other fees which might be due with respect to Sections 1.16 and 1.17 to the Deposit Account of Lerner and Greenberg, P.A., No. 12-1099.

Respectfully submitted,

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For Applicant

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